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Our Docket No.: 42390P9482

Utility Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Patent Application of:

Kumamoto, et al.

Serial No.: 09/741,535

Filed: December 19, 2000

For: MOLDED FLIP CHIP PACKAGE

Examiner: Thai, L.

Art Unit: 2827

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PRELIMINARY AMENDMENT

Box RCE Application
Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination of the above-captioned case, the Applicants respectfully request the Examiner to enter the following amendment and to consider the following remark.

FIRST CLASS CERTIFICATE OF MAILING

I hereby certify that I am causing the above-referenced correspondence to be deposited with the United States Postal Service as first class mail with sufficient postage on the date indicated below and that this paper or fee has been addressed to the Assistant Commissioner for Patents, Washington, D. C. 20231

August 23, 2002
Date of Deposit

Debbie Peloquin
Name of Person Mailing Correspondence

Debbie Peloquin
Signature

8-23-02
Date



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AMENDMENT

Unmarked Version

In the Claims:

Presented below are the amended claims in a clean, unmarked version.

For the Examiner's convenience all pending claims are presented herein.

Please cancel claims ~~2-19~~, and ~~21-32~~.

Please amend the claims as follows:

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- 1 1. (Twice Amended) A method comprising:
- 2 placing an incomplete chip package into a mold formed by a first portion
- 3 and a second portion, the incomplete chip package comprising a
- 4 chip and a substrate electrically coupled using a flip chip process,
- 5 the mold having an upper inner surface in which its entire length is
- 6 coated with release film, and the chip having (i) a top surface facing
- 7 the substrate, (ii) a bottom surface opposite the top surface, the
- 8 bottom surface butting against the upper inner surface, and (iii) one
- 9 or more side surfaces between the top and bottom surfaces;
- 10 injecting a liquid resin into a runner section of the mold, the runner formed
- 11 between ^{the} a first portion and the second portion, and the resin
- 12 encapsulating a significant portion of the one or more side surfaces,
- 13 and filling a first gap between the top surface and the adjacent
- 14 substrate; and

15 curing the resin.

1 20. (Twice Amended) A method comprising:

2 placing an incomplete flip chip package into a bottom inner cavity of a
3 bottom mold portion, the incomplete flip chip package comprising a
4 chip and a substrate, the chip having a top surface coupled by
5 reflowed solder bumps to an upper surface of the substrate, the
6 chip further comprising a bottom surface opposite the top surface
7 and one or more side surfaces between the top and bottom
8 surfaces;

9 mating an upper mold portion with the lower mold portion, the upper mold
10 portion having an upper inner cavity, including an upper inner
11 surface in which its entire length is coated with a release film, and
12 the bottom surface of the chip butts against the upper inner surface,
13 the upper and bottom inner cavities forming a mold inner cavity
14 enclosing the incomplete flip chip package, and forming a runner
15 between the upper and lower mold portions,;

16 injecting a predetermined amount of a liquid resin into the mold inner
17 cavity through the runner, the liquid resin encapsulating
18 substantially all or the one or more side surfaces and substantially
19 all of the upper surface, the liquid resin further filling a gap between
20 the top surface of the chip and an adjacent portion of the upper

21 surface of the substrate, encapsulating the reflowed solder bumps;
22 and
23 curing the liquid resin by maintaining the mold at an elevated temperature
24 for a predetermined period of time, the elevated temperature being
25 equal to or greater than the cure temperature of the filled liquid
26 resin for the predetermined period of time.

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Please add the following new claims:

C²
1 33. (New) The method of claim 1, additionally comprising separating the mold
2 between the upper mold portion and the lower mold portion to expose a
3 molded chip package, the upper mold portion being removed with the
4 release film.

1 34. (New) The method of claim 20, additionally comprising separating the
2 mold between the upper mold portion and the lower mold portion to
3 expose a molded chip package, the upper mold portion being removed
4 with the release film.

1 35. (New) A molded flip chip package comprising solidified resin formed by:
2 placing an incomplete chip package into a mold formed by a first portion
3 and a second portion, the incomplete chip package comprising a
4 chip and a substrate electrically coupled using a flip chip process,
5 the mold having an upper inner surface in which its entire length is

6 coated with release film, and the chip having (i) a top surface facing
7 the substrate, (ii) a bottom surface opposite the top surface, the
8 bottom surface butting against the upper inner surface, and (iii) one
9 or more side surfaces between the top and bottom surfaces;

10 injecting a liquid resin into a runner section of the mold, the runner formed
11 between ^{the} a first portion and the second portion, and the resin
12 encapsulating a significant portion of the one or more side surfaces,
13 and filling a first gap between the top surface and the adjacent
14 substrate; and

15 curing the resin.

1 36. (New) The method of claim 35, additionally comprising separating the
2 mold between the upper mold portion and the lower mold portion to
3 expose a molded chip package, the upper mold portion being removed
4 with the release film.

REMARK

Applicants respectfully request reconsideration of this application as amended. Claims 1 and 20 have been amended; claims 2-19, 21-26, and 31-32 have been cancelled; and claims 33-36 have been added. Therefore, claims 1, 20, and 33-36 are now presented for examination.

The Applicants would like to thank the Examiner for the interview conducted on August 21, 2002. While the Examiner determined during the interview that the amended and new claims are not anticipated by the prior art of record, and will require a new search, the arguments presented herein are directed to the prior art of record for the purpose of removing them as prior art references.

Claims 1, 20, and 33-36 are not anticipated by nor made obvious by Carney (U.S. Patent No. 5,895,229) or Lin (U.S. Patent No. 5,450,283), individually, or in combination

As pointed out during the Examiner interview, neither Carney nor Lin teaches or discloses at the least the following elements that are required by the Applicants' invention as recited by the claims:

- release film that is coated along the entire length of the upper inner surface of the upper inner cavity
- an upper inner surface that is coated with release film
- release film that is removed when the mold is separated

In Lin, a tape is placed in the mold cavity such that the tape makes contact with the backside of the die, but not with the entire length of the top mold platen (see reference numeral 38 in FIGS. 3 and 4). In Lin, tape is not needed along the entire length of the top mold platen because the structure of the mold is such that the tape is not needed along the entire length to aid in the release of the mold. (See Lin, column 4, lines 51-53.) In contrast, in the Applicants' invention as recited by the claims, the release film is coated along the entire length of the upper inner surface of the top portion of the mold, aiding in the separation of the mold.

Secondly, Lin does not teach or disclose that the upper mold surface is lined with tape. It discloses that a "layer of tape 38 is placed inside the mold cavity so that the tape 38 makes contact with the inactive backside" (emphasis added). In contrast, the Applicants' invention as recited by the claims, and as taught by the original specification, requires that the release film be placed on the upper mold surface, not just in the upper mold cavity as in Lin.

Thirdly, Lin does not teach or disclose that when the mold is separated, that the tape is removed along with the mold. Instead, in Lin, the tape must be separately removed (see FIG. 5), since its properties are such that it "adheres better to silicon than to the top mold platen" (Lin, column 4, lines 28-29). In contrast, in the Applicants' invention as recited by the claims, and as taught by the original specification, requires that when the mold is separated, that the release film is removed with it such that the process eliminates the extra step of having to remove the release film from the molded chip package.

Conclusion

Applicants respectfully submit that the claim amendments, and the new claims do not add any new subject matter, and are all supported by the original specification. Furthermore, the Applicants submit that any previous rejections have been overcome by the amendment and remark, and that the claims are now in condition for allowance if no further art is found. Accordingly, Applicants respectfully request that the presented claims be allowed.

Invitation for a Telephone Interview

The Examiner is requested to call the undersigned at (303) 740-1980 if there remains any issue with allowance of the case.

Request for an Extension of Time

The Applicants respectfully petition for an extension of time to respond to the outstanding Office Action pursuant to 37 C.F.R. § 1.136(a) should one be necessary. Please charge our Deposit Account No. 02-2666 to cover the necessary fee under 37 C.F.R. § 1.17(a) for such an extension.

Charge our Deposit Account

Please charge any shortage to our Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Date: August 23, 2002



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